

# Power of TDT with Genomic Imprinting

Wing K. FUNG, *Department of Statistics and Actuarial Science, The University of Hong Kong, China,*

E-mail: wingfung@hku.hk

Yue-Qing Hu, *Department of Statistics and Actuarial Science, The University of Hong Kong, China*

Jiyuan Zhou, *Department of Mathematics, Huaihua University, Huaihua, Hunan 418008, China*

KEY WORDS: Case-parents Trio, Genomic Imprinting, Power, Transmission Disequilibrium Test (TDT)

MATHEMATICAL SUBJECT CLASSIFICATION: 62F03, 92D10

**Abstract:** Some genes affecting the development and behavior of mammals are known to be imprinted and more than 1% of all mammalian genes are imprinted. The power calculations of the transmission disequilibrium test (TDT) based on the non-central Chi squared and normal distribution approximation approaches, allowing genomic imprinting and different paternal and maternal recombination rates, are presented, respectively. The comparisons of the two approaches are demonstrated by simulation and real data analysis. It is concluded that ignoring genomic imprinting can drastically alter the power of TDT and the accuracy of the power calculation of the normal distribution approximation is often higher than the one of the non-central Chi squared distribution approximation.

## References

- [1] Deng, H.W. and Chen, W.M. (2001). The Power of the Transmission Disequilibrium Test (Tdt) with Both Case-Parent and Control-Parent Trios, *Genet. Res. Camb.*, 78, 289-302.
- [2] Knapp, M. (1999). A Note on Power Approximations for the Transmission/Disequilibrium Test, *Am. J. Hum. Genet.*, 64, 1177-1185.
- [3] Risch, N. and Merikangas, K. (1996). The Future of Genetic Studies of Complex Human Diseases, *Science*, 273, 1516-1517.
- [4] Spielman, R.S., McGinnis, R.E. and Ewens, W.J. (1993). Transmission Test for Linkage Disequilibrium: the Insulin Gene Region and Insulin-Dependent Diabetes Mellitus (IDDM), *Am. J. Hum. Genet.* 52, 506-516.
- [5] Strauch, K., Fimmers, R., Kurz, T., Deichmann, K.A., Wienker, T.F. and Baur, M.P. (2000). Parametric and Nonparametric Multipoint Linkage Analysis with Imprinting and Two-locus-trait Models: Application to Mite Sensitization, *Am. J. Hum. Genet.*, 66, 1945-1957.
- [6] Weinberg, C.R. (1999). Method for Detection of Parent-of-origin Effects in Genetic Studies of Case-Parents Triads, *Am. J. Hum. Genet.*, 65, 229-235.